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up to the so-called Dakota sandstone that caps the bluff at that point. The marine *Baptanodon* beds here show a thickness of thirty-five feet. Above these is a series of fresh-water sandstones and shales, sixty-six feet in thickness, which in places contain remains of *Laosaurus*, a typical Jurassic Dinosaur. Immediately above these the Cycads occur in a narrow layer of white sandstone, and with them are various fragments of bones. Next above are fifty-five feet of strata containing vertebrate fossils, apparently indicating the *Atlantosaurus* beds. Above these are thirty feet of barren clays, and over all is the sandstone regarded as Dakota.

Mr. Reed has also sent me specimens of the Cycads found at this locality. As he has had an experience of twenty years or more on the Jurassic of the West, and is otherwise admirably qualified to judge of such horizons, his opinion is entitled to great weight and should settle the question for this locality.

Mr. H. F. Wells, who has carefully explored the Black Hills Cycad horizon, and sent to the Yale Museum over one hundred specimens of these fossils, has also, at my request, sent me a section, made near Blackhawk, on the eastern rim of the hills, a region which I have myself examined, although not recently. This section indicates that the Cycad horizon there is also in the Jurassic, and not the Dakota, and this is borne out by other localities in the same vicinity.

Professor L. F. Ward has published sections examined by him on the southwestern border of the Black Hills in 1893. He found no Cycads actually in place, but decided that the horizon in which they occur is Cretaceous.* I have recently placed in his hands for description all the Western Cycads in the Yale Museum. Our views, however, do not at present coincide as to the

age of the strata containing them, but the new facts which are now being brought to light will, I trust, soon place this matter beyond reasonable doubt.

O. C. MARSH.

YALE UNIVERSITY,

NEW HAVEN, CONN., July 18, 1898.

NOTES ON THE GEOLOGY OF JAMAICA.

THE eastern portion of the island of Jamaica, in the West Indies, is remarkable for its high abrupt mountains, whose ragged outlines resemble those of the high sierras (not the volcanic ranges) of the Pacific side of Central America and Mexico. These mountains rise steeply from the ocean east of Kingston on the south side and near Port Antonio on the north side of the island, and in Blue Mountain peak attain an altitude of about 7,000 feet. The topography is essentially that of subaërial erosion, the sharp rocky mountain ridges being due to the excavation of deep narrow stream valleys in a great uplift which originally extended beyond the limits of the island.

So far as I have been able to learn from observation and conversation with residents, the entire mass of this Blue Mountain system, in the eastern end of the island, is composed of one great white limestone formation. This may be soft and chalky; it may be brecciated and in places quasi-conglomeratic; it may be a hard compact fine-grained sub-crystalline white limestone nearly free from fossils, as in the case of the material used for macadam in the streets of Kingston; or the same white limestone abundantly fossiliferous, as at Port Antonio. This latter locality is an interesting one. Reef-building coral species are numerous represented in the mass of the rock, and the white formation is evidently a coralline limestone. There are the casts of many other marine species of shell-bearing animals, particularly gasteropods and allied

* *Journal of Geology*, Vol. II., p. 250, 1894.

forms. I make no pretensions to expertness in paleontological knowledge, but the fossil fauna at Port Antonio impressed me as being of an Eocene facies. On the Isthmus of Panama, where the horizon is due in the column of strata, there is nothing at all representing this immense coralline limestone of Jamaica. But in Citrus county, Florida, I studied, several years ago, a white coralline Eocene limestone, which seems to me to have a fauna of a facies similar to that at Port Antonio. Certainly there is a remarkably close resemblance between the two formations. If they are parts of the same formation, or limestones formed under like conditions and of the same age, the Blue Mountains of Jamaica consist of a deeply eroded massive 'uplift' of the Vicksburg-Jackson limestone, as the Eocene coralline limestone of the southeastern portion of the United States has been named.

The railroad between Kingston and Port Antonio is built over the white limestone nearly all the way. But for some short distance on the north of the divide and south of Morant Bay the many cuts expose a heavy series of soft or semi-lithified clays, which are probably newer than the limestone.

The only other formation of any importance which was observed on the island is a gravel deposit of Quaternary age which forms an even but gently sloping plain between Kingston and Spanish Town and is represented at intervals on the north coast, where it forms uneven terraces of no great height, indicating apparently a slight uplift of the island in some not very late part of the Quaternary Era.

OSCAR H. HERSHEY.

FREEPORT, ILL., June 24, 1898.

CURRENT NOTES ON ANTHROPOLOGY.

NATIVE AMERICAN LANGUAGES.

In the *Proceedings* of the Canadian Institute, May, 1898, the Rev. E. B. Glass

has a few pages on the Cree language. He discusses its euphony, precision, and the formation of its nouns.

The Rev. John Campbell prints another of his 'discoveries' in the *Transactions* of the Canadian Institute (May, 1898). The title is 'The Dénés of America identified with the Tungus of Asia.' Mr. Campbell has announced so many such discoveries that it is difficult to secure consideration for more of them.

The death of Professor Dr. Friederich Müller, of Vienna, which occurred May 25th, should not be allowed to pass without a tribute to his studies of American languages. In the second volume of his great work 'Grundriss der Sprachwissenschaft' (Vienna, 1882), he presented the analysis of forty-one native tongues and dialects spoken by the aborigenes of this continent, in accordance with the most rigid demands of science. He avoided the treacherous ground of verbal comparisons, and devoted his attention to morphology and grammatical structure. Both in extent and scholarly thoroughness, his work in this branch stands easily ahead of that of any other writer in this generation.

THE STUDY OF DECREASED NATALITY.

Few subjects in anthropology have more practical bearing than that of the decadence of races. This comes most directly from a diminished birth rate. It has been calculated that a minimum of four living children are required to each marriage under ordinary conditions in order merely to prevent diminution. Decrease in natality, therefore, is an ominous outlook for a community.

A study of it in the United States by Dr. K. R. Storer appeared some months ago (reprint from *Atlantic Monthly*, October, 1897). It is disappointing in both facts (?) and conclusions. With his full opportunities of observation he is quite unable to